

Meeting Minutes

for the 4th expert meeting of IHRA pedestrian protection

22-24 February 1999, Stamford Grand Hotel, Adelaide, Australia

Day 1 (Mon. 22 Feb.) Hindmarsh Conference Room, Stamford Grand Hotel

1. Opening of the meeting

The meeting Convener, Mr. Mizuno opened the meeting at 9:30 and Mr. McLean welcomed delegates by stating the schedule of this experts meeting and a subsequent seminar on pedestrian protection sponsored by FORS and Adelaide University.

2. Roll call of delegates

(See attached sheet Appendix 1)

3. Approval of Draft Minutes from 3rd Meeting

The draft minutes (IHRA/PS/74) were approved without change.

Mr. Lawrence delivered a few comments made by Mr. Janssen, having pointed out that the terms of “Free motion” is to be added onto TNO Head Test Tool, “NHTSA Child” onto Chest Test Tool, and priority number 3 is to be put onto “Femur Adult”, while “question mark ?” is to be deleted from “Knee & Tibia”.

Mr. Lawrence also, in the place of Mr. Janssen, proposed that “Ankle, Foot and Arm” are to be included in the body regions. The body agreed to investigate these body regions hereafter. (See attached revised Appendix 2)

Although Mr. Lawrence indicated that CONCLUSION 7 (Action 7) should be corrected clearly so as to address all important body regions in parallel development of test procedures, giving priority to head of child and adult, the body agreed to leave CONCLUSION 7 (Action 7) as it stands without change.

4. Adoption of meeting agenda

The body approved the agenda, Doc. IHRA/PS/75 with minor changes:

-page 2, 12 Acceptable level: change the tile to Criteria / Acceptable level or Threshold.

5. Report on 4th IHRA Steering Committee

Mr. Mizuno introduced that the progress reports was approved as it stands at the 4th Steering Committee held in Geneve November 1998. Mr. Mizuno reported

that the issues on ITS and Side impact principally came up for discussion.

6. Pedestrian safety information from member countries

6.1 EEVC/WG17 & EU/DG activities

Mr. Lawrence reported that EEVC/WG17 has produced their report, which should be formally approved by EEVC Steering Committee this week and it will then be submitted to the European Commission this weekend. Most of the decisions in the revised test methods were agreed unanimous by the experts of the working group, the remainder were supported by the majority of the experts with the French and Italian experts disagreeing with certain aspects.

The chairman's report has annexed the completed test methods written in a form of Draft Directive requested by European commission, and the report also recorded all comments including negative comments for their consideration.

Mr. Lawrence guessed that it will take several months to lay a bill before Parliament. 2-3 months are absolute minimum, and it will take 2-2.5 years to finalize.

Mr. Lawrence introduced improved test methods which are reflected in the final report;

Mr. Lawrence has incorporated a built-in miniature damper in the legform impactor so that the damping of this shear mechanism has been improved, and accepted by the working group. There has been improved dynamic certification method of the legform impactor which better reflects its actual use in the bumper test.

He also outlined a new legform to bumper test that has been developed with a view to apply the test to the vehicles with high bumpers, i.e. off-road vehicle, which hit essentially onto the femur rather than the lower leg and knee area. He indicated that they have developed the test method where the upper legform of fixed mass 9.5kgs is used. They have been using the guide but horizontally near to bumper, and using the same criteria as the upper legform.

As far as the upper legform impactor – bonnet leading edge test is concerned, Mr. Lawrence indicated that they have updated the impact energy curves based on the study results by computer simulation so as to be able to comply with streamlined cars like a Ford Mondeo. There has been a large program of accident reconstruction carried out at TRL so that they have selected the new acceptance

criteria, i.e. max. instantaneous sum of femur forces 5kN, max. femur bending moment 300Nm, from 4kN and 220Nm respectively.

Mr. Lawrence indicated that they have used the upper legform impactor to reconstruct real accident by matching the data in real accident. He felt that about 30% of cars would pass at Euro NCAP now if they had tested at low energy.

Mr. Lawrence also indicated that they have changed to using aluminium to the headform impactor, which was covered by a PVC skin, in order to improve the durability of the headform and to make machining more easy. The accelerometer is mounted on the pillar so that the center of gravity be in the middle to give it good balancing, since the old headform impactor had some vibration in the accelerometer. Consequently the outside diameter with the new headform impactor is the same as the old one, while skin is thicker and the sphere is slightly smaller. He indicated that they also introduced a new definition of the bonnet rear boundary to avoid windscreen impacts, and that mandated the working group to restrict the test up to the base of the windscreen, not to include the windscreen.

6.2 U.S. Activities

Mr. Saul briefly explained the recent activities in the State that he has been involved in reanalyzing some of PCD Study cases. He also introduced that they has a test program which will allow two vehicles several points to check by running a comparison test among ISO procedure, EEVC procedure ,and NHTSA procedure. They intend to run a few tests using head stuff (procured from TNO) so that they can see stiff discrimination on the vehicle (stiff / less stiff zone), and how much influence the difference of two kinds of head mass requirements, (i.e. 4.8kg/4.5kg) makes on the HIC value etc.

Mr. Saul indicated that PCDS (Pedestrian Crash Data Study) was likely to terminate halfway through, having collected 600 cases, due to financial and technical reasons.

6.3 Australian Activities

Mr. McLean reported the recent activities in Australia that they have been continuing to develop the test facility where they have had the headform test running for a couple years. They also try to operate EEVC legform test, and EEVC upper legform test is designed to use the same launching mechanism that might

be ready this week.

He indicated that there are halfway through EEVC adult headform test in progress with top 10 selling modern cars in Australia.

6.4 Japanese Government Activities

Mr. Ishikawa reported that there are some work items being conducted by the joint project (i.e. the Ministry of Transportation and Nagoya university). They have been conducting in-depth study including pedestrian protection, referencing approximate 120 cases out of the ITARDA data. The report will be available at the next meeting.

They also have been running headform impact test against windscreen area including A-pillar and rear edge of bonnet, although the test results were still only 7 cases. Child headform test against “bull bar” is also currently in progress.

6.5 ACEA Activities

Mr. Hahn introduced the outline of the TNO’s investigation making use of mathematical simulation sponsored by VDA with a view to improve the vehicles for pedestrian friendliness. (Doc. IHRA/PS/79)

Mr. Hahn indicated based on the investigation that the optimized vehicles which has specific design for satisfying EEVC requirements and accordingly providing reduced injury criteria for one type of body size (ex. adult) might have adverse effects to the other type of body size (ex. child). And for that further research and investigation is needed to explain the difference between EEVC subsystem test methods and the supposed full body responses.

Mr. Hahn also indicated that overall body injury risk should be assessed for primary, secondary and other impact phases, taking it into account that injury criteria value in secondary impact with ground might be not less than its primary impact hit by vehicle.

6.6 JAMA Activities

Mr. Sasaki, in answer to members' query on pedestrian dummy at the last IHRA, introduced the recent development of simulation model and pedestrian dummy conducted by Honda based on the abstract of SAE paper, stating that the existing dummies have stiffer characteristics than Post Mortem Human Subjects (PMHS), and the dummy kinematics during a collision is different from that of human body. There are some modifications being made with “THOR”, and component tests

were carried out to get and check the characteristics of each part to define modeling.

Full scale tests were conducted 9 times, and the results of tests were kinematically comparable with PMHS test results in a biofidelic manner in terms of trajectories of the body and resultant head velocity.

He indicated that hereafter they need to make modifications by increasing the overall stiffness of the knee and lower leg as well as by improving its kinematics at lower impact speed so as to correspond better to human response.

CONCLUSION 1 (Action)

Mr. Ishikawa will try to get the TV videotape showing Honda dummy which had be released and opened to the public by Honda.

7 Survey results

-U.S.

Mr. Saul reported US revised data which shows number of pedestrian injuries by contact location and body region for AIS 2-6 injuries based on the classification categories of NHTSA pedestrian crash data study, putting on the same matrix format as the former table. (Doc. IHRA/PS/62 r1)

He commented that 292 cases on the table means the number of cases in the PCD Study they currently have available to copy, to review, or to summarize the data bases.

Mr. Saul analyzed the US PCDS to clarify the "LTV/SUV" involvement on the said matrix chart. He indicated that 43 cases were for AIS 2-6 injuries level due to LTV/SUV's involvement, and 8 cases out of 43 cases were for Age <16.

Mr. Saul noted that chest, abdomen, and pelvis injuries by coming into contact with "leading edge of bonnet and wing" appear to be predominant in LTV/SUV in comparison between Table 4 and Table 5. (Doc. IHRA/PS/81)

-UK

Mr. Lawrence briefly introduced accident statistics which taken from UK national statistics based on Scottish hospitals inpatient data base. He indicated that pedestrian casualties and serious injuries are both greater in UK than in European Community.

8.2 Age group of the injured pedestrians

- Australia

Mr. McLean reported the fatal pedestrian statistics in South Australia for the period 1991 – 1997 taken from investigation report.

The graph shows the pedestrians fatally injured cases by age group. As a age group, there is one peak of the fatally injured in the young layer of 20-30 years old, the number decreases in the layer to 40 to 60 years old, and the number has become the peak again in the layer to 60 to 80 years old. Mr. McLean indicated that it can be said that the abbreviation half of fatally injured pedestrians were intoxicated.

He also indicated that the remarkable rate with impact speed of vehicles was 50 to 70 km/h in fatal pedestrian accidents in South Australia. (Doc. IHRA/PS/82)

CONCLUSION 2 (Action)

Mr. Lawrence offers pedestrian fatal crash data at the next meeting or hopefully before it for every impact speed and for age group in Europe.

- Japan

Ishikawa indicated that having analyzed JARI data 109 case during 1987-1988, the peaks by age of the pedestrian fatal accident are 5 years old and around 80 years old, and 5-6 years old was a peak of the pedestrian injury accident case. Moreover, as for the type of a car, the passenger vehicles occupied about 60%. Although these data was of ten years ago, it was described that there was probably no change not much with the latest tendency.

According to ITARDA data (118 cases) in 1993-1998, the vehicle speed up to 40km occupied about 70% of the accidents, and about 50% of the head injuries with MAIS2+ was attributed to the impact velocity up to 40km/h, and about 65% of the knee & lower leg injuries with MAIS2+ was the speed up to 40km/h.

CONCLUSION 3 (Action)

Mr. Ishikawa provides the above-mentioned ITARDA data at the next meeting after opening to the public formally.

- U.S.

Mr. Saul introduced the distribution by age group, by three sorts of data source about pedestrian accident data of the United States in 1997. FARS, i.e. Agency of Federal Accident Recording System expresses the fatal accident of 5300 of the

United States, and, on the one hand, GES (General Estimate System) shows injury data by the same Agency. Although FARS data and GES data show another peak from 35 years old to 44 years old and the almost same tendency is in sight, FARS data shows 14% of the peak of frequency from 5 years old to 15 years old. Mr. Saul added also as this being considered to be based on the speed down of the car in the school circumference or residential area. (Doc. IHRA/PS/84)

Mr. Saul classified impact speed and cumulative frequency for every AIS level based on PCD study, and pointed out that 40% of the frequency accompanied by 2 or greater AIS head injuries and the leg injuries showed having happened at the speed up to 40km/h.

He indicated that this tendency is consistent with data provided by Mr. Ishikawa, and they should be available to combine the data from the countries by putting in data of each country on a spread sheet. (Doc. IHRA/PS/85)

- Germany

Mr. Hahn introduced the distribution by age of the pedestrian accident in Germany, and it was shown that the peak by age is 3-7 years old. (Doc. IHRA/PS/86)

CONCLUSION 4

Six years old child would be considered for the test tools as well as adult test tools and the test procedure will need to be realized the wide range wrap-around distance reflecting accident survey and accident data.

CONCLUSION 5 (Action)

Mr. Saul will try to find the HIC scaling for six years old child with reference to the said test procedures.

Day 2 (Tues. 23 Feb.) Hindmarsh Conference Room, Stamford Grand Hotel

8.3 Cumulative curve of impact velocity

In case impact velocity is determined, Mr. Ishikawa indicates that it needs to be argued in advance which data source is to be used, i. e. whether all injury cases should be used or AIS2+ cases should be used or we should use MAIS2+ injury cases. Mr. Ishikawa proposed that when discussing test procedure and impact velocity, MAIS2+ should have been adopted from the viewpoint of better

distribution between impact velocity and impact severity compared with AIS2+ cases.

On the other hand, Mr. Lawrence indicated that we have to look at not only head and knee & lower leg, but all body regions in terms of the distribution of severity and impact velocity.

CONCLUSION 6 (Action)

Mr. Saul creates a sample spread sheet and sends it to members in advance until next meeting, since the collision speed as well as the correlation of the injured body regions and the vehicle contact sources are specified, and data from each country needs to be incorporated on a common unification format (by Microsoft Excel). Mr. Ishikawa takes the charge to sort out JARI/ITARDA data, Hanover data by Mr. Lawrence/Mr. Janssen, NHTSA data by Mr. Saul, Australian data Mr. McLean.

As the categories which should be indicated to a spread sheet, it considers as AIS, body region (sub-region), collision speed, vehicle contact sources, the collection term of data, the model age of the vehicle, etc.

9. Definition of the passenger car

Mr. Mizuno brought up again the issue in order to make sure on the definition of "passenger vehicle", since the working group by the conventional talks assumes that it shall be the vehicle with GVM not exceeding 2.5 metric tons, and accommodation of up to 9 occupants.

The group couldn't reach any further agreement this time. Mr. Mizuno proposed to leave the definition as it stands for now, and defer building consensus.

It will be tried to balance next time by inputting US specific conditions on the vehicles.

CONCLUSION 7 (Action)

U.S. delegates will offer the information on specific vehicles in U.S., in order to balance the definition of passenger vehicles next time in the meeting.

10. Test tool

10.1 Head impactor (Adult, Child)

Mr. Ishikawa developed specification of test tool by TNO, ISO, and NHTSA on a table for every item that Mr. Janssen offered, and carried out comparison

examination of this as a base.

Mr. Lawrence responded that a status of tools should be filled in the comparison chart. Because completeness of each tool differs respectively, that the chart should show the status whether the tool is currently mass-produced, or that is in the preparation, or a prototype, or just a specification.

Furthermore, the body agreed that three specifications, i.e. certification and measurement capability and temperature sensitivity are added to the chart of Ishikawa. (Doc. IHRA/PS/90)

CONCLUSION 8 (Action)

Member submits the information on the addition about the data sheet that Mr. Ishikawa created, hopefully by the end of March, Mr. Ishikawa tries so that a sheet may be completed in less than 1 month and a member can be supplied at the end of April.

The body decided that the information and reference from each country are collected not only about headform or legform but about other test tools. Priority is first given to the information about headform and legform by the term in that case.

(Doc. IHRA/PS/90)

Day 3 (Wed. 24 Feb.) Hindmarsh Conference Room, Stamford Grand Hotel

10.2 Video presentation of test tool

Mr. Ishikawa introduced the test situations by video which shows the bonnet leading edge test supposing body reconstruction, besides headform test performed supposing a different impact angles and different various impact points, legform impact tests, and full scale dummy tests by 30km/h.

Mr. Lawrence also introduced a video about N-Cap test which included high speed films of pedestrian tests.

In response to the task at the 3rd IHRA meeting, Mr. Ishikawa reported the research results that JARI conducted computer simulation by MADYMO to see HIC value onto the bonnet, supposing head mass, diameter, and impact angle respectively be a variable. As a conclusion, he indicated that change of an impact angle has big influence on the determination of HIC value. (Doc. IHRA/PS/94)

Mr. Ishikawa also introduced ISO documents (ISO/TC22/SC10/WG2 N457) which

shows the influence of skinned/non-skinned headform impactor, and ISO documents (ISO/TC22/SC10/WG2 N483) which indicates the difference between two propelling system, i.e. a free flight, and a guided system.

11. Test procedure

Mr. Ishikawa listed the key words in test procedure on the page 7-9 of (Doc. IHRA/PS/90), and asked the member for cooperation to gather information and comments from them so that the data sheets on the test procedures may be completed within a few months.

CONCLUSION 9 (Action)

Following Mr. Ishikawa's proposal on how to collect the information of the test procedures, the body agreed to submit the information/comments with respect to the key words listed on the data sheets that Mr. Ishikawa created, hopefully within a few months. Mr. Ishikawa tries so that the data sheets may be completed as soon as possible and members can be supplied by the next IHRA meeting.

(Doc. IHRA/PS/90)

12. Criteria / Acceptance level or Threshold

12.1 Setting the target injury level

12.2 Head (Adult, Child) Criteria, Threshold

Although there was also a proposal adopting injury criteria, such as 80G-3ms, as calculation of head injury criteria, it resulted in the conclusion that it will be realistic to use HIC as injury criteria of the head in the present condition.

As far as threshold is concerned, the correlation of HIC vs. AIS / Injury Probability will be examined first in agreement with Sasaki's proposal.

CONCLUSION 10 (Action)

With respect to the threshold of head, Mr. McLean will examine first the correlation of HIC vs. AIS, and HIC vs. Injury Probability by the next meeting.

12.3 Knee & Tibia (Adult) Criteria, Threshold

Mr. Lawrence raised the questions on the method of accident data analysis, and the method of accumulation distribution analysis about new acceptance value which JARI proposed. (Doc. IHRA/PS/88)

Mr. Lawrence showed the risk curve which shows the correlation of peak acceleration and knee fracture, and he indicated that the criteria and the threshold which were submitted to EEVC/WG17 were satisfactory.

On the other hand, Mr. Ishikawa refuted Mr. Lawrence's statement as this data not showing the correlation of acceleration and knee fracture.

Moreover, Mr. Ishikawa claimed that when logistic analysis was performed, it should have been premised on the distribution ratio between injured cases and non-injured cases in which made the distribution of an actual world reflect.

In addition, it was claimed that the leg test method which EEVC/WG17 proposed was not completed as a test method at present, since biofidelity of impactor is not prescribed.

However, this argument will be carried over to the meeting next time for time restrictions.

13. Computer Simulation

The body felt that the simulation is required of the research stage, such as the simulation for the determination of test conditions, and verification of the correlation with subsystem tests. The felt that it is required to continue the argument on how they use the simulation also in the meeting after next time.

CONCLUSION 11 (Action)

Mr. Ishikawa will offer the data set of the pedestrian model announced at Stapp Conference, if the consent of co-researchers is obtained.

14. Revision for action list (if any)

According to the revised "Action List" that Mizuno created, charge and the date were confirmed for every item. (Refer to Action List)

15. Status report to IHRA Steering Committee

Mr. Mizuno requested to provide, if there are comments, since it sends to members about the status reports submitted to steering Committee planned in June.

17. Next meeting

The next IHRA experts meeting is provisionally scheduled in Japan in September due to its rational to drop in Japan and to participate in the way of the itinerary in consideration of some of members being going to participate in IRCOBI in

Spain.

Members are requested to get back to Mr. Mizuno with their convenient schedules in reply to Mr. Mizuno's proposals that will be done within a few months.

18. Adjournment

Mr. Mizuno thanked all members for attending and adjourned the meeting at 17:30, 24, February.

Appendix 2

Body regions for possible test procedures

Body regions	Priority		Test tool	Test procedure	Acceptance level	
	Adult	Child			Criteria	Threshold
Head	1	1	(Free motion) TNO 1, TNO 2 * TNO 1, * TNO 2	EEVC/ISO		
Neck						
Chest	3	2	* NHTSA			
Abdomen	3	2				
Pelvis	3	2				
Femur	3		TRL	EEVC		
Knee & Tibia	2		TRL/NHTSA/JARI	EEVC/ISO		
Ankle, Foot & Arm						

Note : : Adult
* : Child